

**Amendments to the claims:**

This listing of claims will replace all prior versions and listings of claims in the application.

**Listing of Claims:**

1.     **(original)** A method for monitoring protein synthesis in a protein synthesis system, the method comprising:  
          providing a marker for protein synthesis in the system, said marker being detectable through detection of electromagnetic radiation;  
          detecting electromagnetic radiation emitted from the system; and  
          analyzing said emitted radiation to monitor protein synthesis activity in said system.
2.     **(original)** The method of claim 1 wherein the system comprises a bacterium or bacterial culture.
3.     **(original)** The method of claim 1 wherein the system comprises at least one cell.
4.     **(original)** The method of claim 3, wherein the system comprises at least one of a cell-line or a cell culture.
5.     **(original)** The method of claim 1 wherein the system comprises a cell-free protein translation system (*in-vitro* translation system).
6.     **(original)** The method of claim 1 wherein one or more of ribosomes, ribosomal RNA, ribosomal proteins, tRNAs, or amino acids in the system are artificially adapted to provide said marker.
7.     **(original)** The method of claim 1 wherein said marker comprises at least a portion of one or more of natural ribosomes, ribosomal RNA, ribosomal proteins, tRNAs, or amino acids.

8.     *(currently amended)* The method of ~~any of~~ claims 1-7 wherein said marker comprises at least one photo-active component.
9.     *(currently amended)* The method of ~~any of~~ claims 1-8, wherein said emitted radiation comprises radiation obtained by energy transfer between at least two of a plurality of components of the system.
10.    *(original)* The method of claim 9 wherein said marker comprises at least one fluorescent donor-acceptor pair.
11.    *(original)* The method of claim 10, wherein said emitted radiation comprises a FRET (Fluorescence resonance energy transfer) signal.
12.    *(currently amended)* The method of ~~any of~~ claims 8-11 wherein said emitted radiation comprises a fluorescent signal.
13.    *(currently amended)* The method of ~~any of~~ claims 8-12 wherein at least a portion of said marker comprises at least one of a fluorescent protein, a fluorescent dye, a quantum dot or a luminescent substance.
14.    *(original)* The method of claim 13, wherein said luminescent substance comprises a luminescent protein or portion thereof.
15.    *(currently amended)* The method of ~~any of~~ claims 1-8, wherein said marker comprises a first portion being a fluorescent substance and a second portion for quenching said fluorescent substance.
16.    *(original)* The method of claim 15, wherein said detecting comprises detecting a reduction in emitted radiation.

17. (*currently amended*) The method of ~~any of~~ claims 8-16, wherein at least a portion of said marker is covalently or non-covalently bound to a tRNA.
18. (*currently amended*) The method of ~~any of~~ claims 8-17, wherein at least a portion of said marker is covalently or non-covalently bound to a portion of a ribosome.
19. (*original*) The method of claim 18, wherein said portion of said ribosome is at or near at least one of the A site, P site, E site or peptide exit channel shite.
20. (*currently amended*) The method of claims 18 ~~or 19~~, wherein said at least a portion comprises an amino acid.
21. (*currently amended*) The method of ~~any of~~ claims 1-20 wherein said detecting comprises irradiating the system with electromagnetic radiation.
23. (*currently amended*) The method of ~~any of~~ claims 1-21 wherein said emitted radiation is detected with a microscope.
24. (*currently amended*) The method of ~~any~~ claims 1-23, adapted to measure emitted radiation from a single ribosome.
25. (*original*) The method of claim 24, wherein said marker comprises a donor-acceptor fluorescent pair suitable for performing single pair FRET and wherein said emitted radiation occurs upon performing single pair FRET.
26. (*currently amended*) The method of ~~any of~~ claims 1-23, adapted to measure signals from a plurality of ribosomes.

27. *(original)* The method of claim 26, wherein said analyzing said emitted radiation comprises performing signal analysis of emitted radiation from said plurality of ribosomes.
28. *(currently amended)* The method of ~~any of~~ claims 1-27, further comprising:  
identifying at least one protein being synthesized through said analyzing said emitted radiation.
29. *(currently amended)* The method of ~~any of~~ claims 1-28, wherein said detecting is performed in real time.
30. *(currently amended)* The method of ~~any of~~ claims 1-29, wherein said detecting further comprises:  
monitoring protein synthesis by detecting a plurality of protein synthetic processes over a period of time.
31. *(original)* The method of claim 30, wherein said plurality of protein synthetic processes comprise a plurality of interactions between a ribosome and a plurality of different tRNA molecules.
32. *(original)* An apparatus for measuring protein synthesis by a protein synthesis system, said apparatus comprising:  
a container for containing a plurality of components for the system, wherein at least one component is capable of emitting electromagnetic radiation due to a protein synthesis activity;  
a detection system to measure emitted radiation from the system; and  
a computational device to analyze said emitted radiation and determine the protein synthesis activity in said system.
33. *(original)* The apparatus of claim 32 wherein the system comprises a bacterium or bacterial culture.

34.    **(original)** The apparatus of claim 32 wherein the system comprises at least one cell.
35.    **(original)** The apparatus of claim 34, wherein the system comprises at least one of a cell-line or a cell culture.
36.    **(original)** The apparatus of claim 32, wherein the system comprises a cell-free protein translation system (*in-vitro* translation system).
37.    **(original)** The apparatus of claim 32, wherein one or more of ribosomes, ribosomal RNA, ribosomal proteins, tRNAs, or amino acids in the system are artificially adapted to provide said marker.
38.    **(original)** The apparatus of claim 32, wherein said marker comprises at least a portion of one or more of natural ribosomes, ribosomal RNA, ribosomal proteins, tRNAs, or amino acids.
39.    **(currently amended)** The apparatus of ~~any of~~ claims 32–38, wherein said marker comprises at least one photo-active component.
40.    **(currently amended)** The apparatus of ~~any of~~ claims 32–39, wherein said emitted radiation comprises radiation obtained by energy transfer between at least two of a plurality of components of the system.
41.    **(original)** The apparatus of claim 40, wherein said marker comprises at least one fluorescent donor-acceptor pair.
42.    **(original)** The apparatus of claim 41, wherein said emitted radiation comprises a FRET (Fluorescence resonance energy transfer) signal.

43. (*currently amended*) The apparatus of ~~any of~~ claims 39-42, wherein said emitted radiation comprises a fluorescent signal.

44. (*currently amended*) The apparatus of ~~any of~~ claims 39-43, wherein at least a portion of said marker comprises at least one of a fluorescent protein, a fluorescent dye, a quantum dot or a luminescent substance.

45. (*original*) The apparatus of claim 44, wherein said luminescent substance comprises a luminescent protein or portion thereof.

46. (*currently amended*) The apparatus of ~~any of~~ claims 32-39, wherein said marker comprises a first portion being a fluorescent substance and a second portion for quenching said fluorescent substance.

47. (*original*) The apparatus of claim 46, wherein said detection system detects a reduction in emitted radiation.

48. (*currently amended*) The apparatus of ~~any of~~ claims 39-47, wherein at least a portion of said marker is covalently or non-covalently bound to a tRNA.

49. (*currently amended*) The apparatus of ~~any of~~ claims 39-48, wherein at least a portion of said marker is covalently or non-covalently bound to at least a portion of a ribosome.

50. (*original*) The apparatus of claim 49, wherein said portion of said ribosome is at or near at least one of the A site, P site, E site or peptide exit channel site.

51. (*currently amended*) The apparatus of claims 49 ~~or 50~~, wherein said at least a portion comprises an amino acid.

52. **(currently amended)** The apparatus of ~~any of claims 32-51~~ wherein said detection system irradiates the system with electromagnetic radiation.
53. **(currently amended)** The apparatus of ~~any of claims 32-52~~ wherein said detection system comprises a microscope.
54. **(currently amended)** The apparatus of ~~any of claims 32-23~~, wherein said detection system measures emitted radiation from a single ribosome.
55. **(original)** The apparatus of claim 54, wherein said marker comprises a donor-acceptor fluorescent pair suitable for performing single pair FRET and wherein said emitted radiation occurs upon performing single pair FRET.
56. **(currently amended)** The apparatus of ~~any of claims 32-53~~, wherein said detection system measures a plurality of signals from a plurality of ribosomes.
57. **(original)** The apparatus of claim 56, wherein said computational device performs signal analysis of emitted radiation from said plurality of signals.
58. **(currently amended)** The apparatus of ~~any of claims 32-57~~, further comprising equipment for identifying at least one protein being synthesized through said analyzing said emitted radiation.
59. **(currently amended)** The apparatus of ~~any of claims 32-28~~, wherein said detection system operates in real time.
60. **(currently amended)** The apparatus of ~~any of claims 32-59~~, wherein said detection system monitors protein synthesis by detecting a plurality of protein synthetic processes over a period of time.

61. *(original)* The apparatus of claim 60, wherein said plurality of protein synthetic processes comprise a plurality of interactions of a single ribosome with a plurality of different tRNA molecules.
62. *(currently amended)* A method for analyzing a chemical compound library, said method comprising:
- administering each of the compounds to a protein translation system;
  - measuring a response of said system according to the method of ~~any of claims 1-31~~;
  - analyzing said measurement to provide information about said compound.
63. *(currently amended)* An apparatus for analyzing a chemical compound library, comprising: a well array plate comprising a plurality of wells:
- a robot for placing a protein synthesis system into the wells;
  - a robot for administering chemical compounds into said wells; and
  - an apparatus according to ~~any of claims 32-61~~ to analyze protein synthesis by said system.
64. *(currently amended)* A method for determining cellular protein pathways, comprising:
- selecting a cellular or bacterial culture;
  - placing said culture in a plurality of sample containers;
  - subjecting said culture to at least one condition in each of said containers;
  - measuring protein synthesis in each of said contains according to the method of claims ~~1-31~~; and
  - analyzing protein expression patterns in all containers to determine protein pathways.
65. *(original)* A method for ribosome labeling to allow protein synthesis monitoring, said method comprising:
- selecting a fluorescent probe;
  - selecting a location on at least one of a ribosomal RNA or on a ribosomal protein according to at least one of a characteristic of said probe or a characteristic of at least one of said



ribosomal RNA or said ribosomal protein; and  
attaching said probe to said location.

66. *(original)* The method of claim 65, wherein said selecting said fluorescent probe is performed according to at least one of a suitable excitation or emission property of said probe.

67. *(original)* A method for protein production monitoring, said method comprising:  
selecting a protein synthesis system for PSM analysis;  
selecting a fluorescent probe;  
selecting a location on at least one of a ribosomal RNA or on a ribosomal protein  
according to at least one of a characteristic of said probe or a characteristic of at least one of said  
ribosomal RNA or said ribosomal protein;  
attaching said probe to said location to perform PSM; and  
analyzing signals from said probe to monitor the protein synthesis system.

68. *(original)* A method for detecting protein synthesis in a protein synthesis system,  
the method comprising:  
providing a marker for protein synthesis in the system, said marker having a label;  
attaching said marker to at least one component of the system; and  
detecting said label to determine protein synthesis activity in the system.

69-85. *(canceled)*